POST-SPLENECTOMY VACCINATION

Original Release/Approval		30 Mar 2008	Note: This CPG requires an annual review.	
Reviewed:	Dec 2008	Approved:	5 Jan 08	
Supersedes:	Post Splenectomy Vaccination, 5 Nov 08			
☒ Minor Changes (***or)***		☐ ***Changes are substantial and require a thorough reading of this CPG***		***(or)***
☐ Significant Changes		Added Appendix A: Includes 6-month review of use of the CPG in theater; includes additional clinical references.		

1. Goal. All post-splenectomy and functionally asplencic trauma patients in the CENTCOM AOR will receive appropriate and timely vaccination. All vaccinations will be documented in the longitudinal medical record and include date/time of physician order and date/time of administration by nursing personnel.

2. Background. Overwhelming, post-splenectomy sepsis (OPSS) is a rare but devastating complication with a case mortality rate in most studies approaching 50%.[1] OPSS represents a life-long risk, with the incidence in trauma patients estimated to be < 0.5%.[2] It is estimated that splenectomized individuals are up to 540 times more susceptible to lethal sepsis than the general population.[3] The majority of trauma surgeons provide some sort of post-splenectomy vaccination to their patients, although to date, there is no consensus on timing of initial vaccination, vaccination regimen, or future re-vaccination. In 2002, Shatz conducted a survey of trauma surgeons regarding their vaccination practices in post-splenectomy patients. Of 261 active surgeons, 99.2% immunized their splenectomized patients: 1) All but two provided the pneumococcal vaccine, 2) 62.8% advocated the meningococcal vaccination, 3) 72.4% added the Haemophilas influenzae vaccine, and 4) 56.7% gave all three vaccines. The timing of vaccination ranged from the immediate post-operative period to six weeks following surgery.[4]

Within the CENTCOM AOR, > 99% of splenic injuries are managed by total splenectomy. Since these patients are at risk for OPSS, there must be a standardized process to provide post-splenectomy vaccination, accurate documentation, and life-long tracking to identify outcomes (See Appendix A for additional clinical background).

3. Indications. All splenectomized patients and those deemed to be functionally asplenic (i.e., < 51% normal architecture and/or vascularization in the remaining splenic segment).

4. Dosing.

a. Streptococcus pneumoniae (23-valent polysaccharide): Single dose.

b. Haemophilus influenzae B. (Polysaccharide-protein conjugate) By patient age:

1) 2 - 6 months: Three doses + booster

2) 7 - 11 months: Two doses + booster

3) 12 - 14 months: One dose + booster

4) > 15 months: Single dose

c. Neisseria meningitidis (Quadrivalent): Single dose

5. Timing.

a. All US forces and all patients for AE to LRMC: Administer all three vaccines in the immediate postoperative period at the first Level III facility. Vaccinations may be given at a Level IIb if they are available. For patients evacuated directly from Level IIb to a Level IV facility, vaccinate at the Level IV facility.

b. Host nation and other patients NOT for AE to LRMC: Administer all three vaccines in the immediate postoperative period at the first Level III facility, but no later than the 14th postoperative day.

6. Documentation

a. **A dated, timed, and signed physician order for all three vaccines will be documented on the physician order form.** Note: If any or all three vaccines are not ordered, there must be clear documentation indicating this, as well as the rationale for why one/more vaccines were not ordered. This facilitates clear communication along the continuum of care.

b. **Vaccine administration by nursing personnel on the medication administration record will include a dated, timed, and signed nursing entry for each of the three vaccines.** If any or all of the three vaccines are ordered, but not administered (for any reason), the ordering physician must be notified, and there must be clear documentation indicating this and the rationale for why one/more vaccines were not administered. Also, document which provider was notified. This facilitates clear communication along the continuum of care.

c. **Documentation in the electronic medical record for the physician order, dispensing from the pharmacy or immunization clinic, and nursing administration is preferred when possible.**

7. References.

[1] Prevention of pneumococcal disease: recommendations for the Advisory Committee on Immunization Practices (ACIP). *MMWR Mob Mortal Wkly Rep*. 1997; 46:12-15.

[2] Crivitz W. Overwhelming postsplenectomy infection. *Am J Hematol*. 1977; 2:193- 201.

[3] O'Neal BJ, McDonald JC. The risk of sepsis in the asplenic adult. *Ann Surg*. 1981; 194:775-778.

[4] Shatz David V. Vaccination practices among North American trauma surgeons in splenectomy for trauma. *J Trauma.* 2002; 53:950-956.

Approved by CENTCOM JTTS Director, JTS Director and Deputy Director and CENTCOM SG

Appendix A

Timing of Vaccination after Splenectomy

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22 Dec 2008

Overwhelming post-splenectomy sepsis is an uncommon, but rapidly life-threatening complication of splenectomy, occurring at the rate of approximately 1 per 1000 patient-years. Immunization with vaccines protective against encapsulated organisms (e.g. Streptococcus pneumonia, Nisseria meningitis, Hemophilus influenzae) drops this risk to approximately 1 per 106 patient-years. Appropriate prophylactic immunization of injured warriors undergoing splenectomy was not reliably occurring until the recent development of a Clinical Practice Guideline suggesting immunization with appropriate vaccines immediately after splenectomy. During the most recent two months of evaluation, immunization rates are 100%. At issue is the effectiveness of vaccination at this time period. A literature search was performed with recent pertinent references listed below.

A summary of the pertinent studies is included in Table 1 below. The Surgical Infection Society recommends that patients who cannot be immunized prior to splenectomy receive vaccination two weeks after splenectomy (Grade D recommendation: expert opinion). In summary, antibody responses to vaccination in humans after splenectomy have been shown to be improved if there is a two week delay in immunization. Likely due to the very low incidence of overwhelming post-splenectomy sepsis, there is no evidence to support an outcome benefit related to this delay.

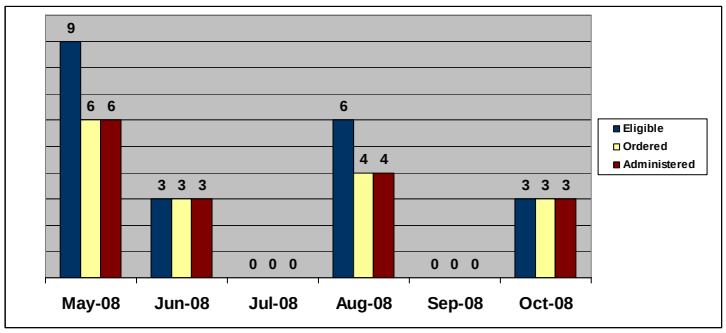
Table 1. Summary of Pertinent Studies

Reference	Species	Endpoint	Notes
Shatz	Human (splenectomy)	Antibody response	Improved Ab response at 2 weeks (= normal controls) after splenectomy compared to 1 day, 1 week
Werner	Rat (splenectomy)	Antibody response	Improved response 1 week, 1 month post-splenectomy
Schreiber	Rat (splenectomy, *S pneumo* challenge)	Survival	No difference in survival in early (1 day) vs late(42 d) immunization. Both better than unimmunized controls
Clayer	Rat (splenectomy)	Antibody response	Ab response decreased early (1 d) and late (1 y) after splenectomy compared to normal controls
Werner	Rat (Hem shock, then splenectomy)	Antibody response	No difference in Ab response 1 d vs 28 d s/p splenectomy plus shock

Currently there is little evidence that patients requiring immunization are not receiving them. Of patients receiving splenectomy as part of their treatment in theater between May and Oct of 2008, 17/21 received appropriate immunization (Figure 1).

While it appears that antibody response to immunization is improved in humans when waiting two weeks post-injury, there is no evidence to suggest that this delay is protective for overwhelming post-splenectomy sepsis. The current process of immunization at the time of splenectomy is yielding appropriate immunizations in warfighters requiring splenectomy and will be continued.

Figure 1.
Immunizations received in patients undergoing splenectomy; May-Oct 2008



Abbreviated Reference List:

[1] Shatz DV, Schinsky MF, Pais LB, Romero-Steiner S, Kirton OC, Carlone GM., Immune responses of splenectomized trauma patients to the 23-valent pneumococcal polysaccharide vaccine at 1 versus 7 versus 14 days after splenectomy. J Trauma. 1998 May;44(5):760-5; discussion 765-6

[2] Werner AM, Solis MM, Vogel R, Southerland SS, Ashley AV, Floyd JC, Brown C, Ashley DW. Improved antibody responses to delayed pneumococcal vaccination in splenectomized rats. Am Surg. 1999 Sep;65(9):844-7; discussion 847-8.

[3] Schreiber MA, Pusateri AE, Veit BC, Smiley RA, Morrison CA, Harris RA. Timing of vaccination does not affect antibody response or survival after pneumococcal challenge in splenectomized rats. J Trauma. 1998 Oct;45(4):692-7; discussion 697-9

[4] Clayer MT, Drew PA, Jamieson GG. Antibody responses following splenectomy: implications for the timing of prophylactic vaccination. Aust N Z J Surg. 1992 Feb;62(2):142-6.

[5] Werner AM, Katner HP, Vogel R, Southerla SS, Ashley AV, Floyd JC, Brown C, Ashley DW. Delayed vaccination does not improve antibody responses in splenectomized rats experiencing hypovolemic shock. Am Surg. 2001 Sep;67(9):834-8.

[6] Howdieshell TR, Heffernan D, Dipiro JT; Therapeutic Agents Committee of the Surgical Infection Society. Surgical infection society guidelines for vaccination after traumatic injury. Surg Infect (Larchmt). 2006 Jun;7(3):275-303.